

Appl. No. : 10/648,848  
Filed : August 21, 2003

### AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

#### LISTING OF CLAIMS

1-23. (Canceled)

24. (Currently amended) A method of determining the location of a decoding sequence on an array composition, said method comprising:

a) providing an array composition comprising:

i) a substrate with a surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation distributed on said discrete sites, wherein each subpopulation comprises ~~an identifier nucleic acid sequence~~ sequences comprising:

1) ~~[[a]] the same~~ primer sequence; and

2) a different decoding sequence adjacent to said primer sequence;

wherein said microspheres are distributed on said surface; and

b) ~~adding to said array composition providing a first probe of a set of combinatorial decoding probes each probe comprising :~~ i) a priming sequence complementary to said primer sequence, a variable sequence, ~~ii) a and at least one decoding nucleotide included in said variable sequence that will basepair with at least one nucleotide of at least one of said decoding sequences, said decoding nucleotide comprising a label wherein said first set comprises different subsets of combinatorial decoding probes, each subset having the same decoding nucleotide and a first label specific to said same decoding nucleotide; and~~

c) adding to said array composition a subset of said first set of combinatorial decoding probes and detecting the presence of said first label, thereby determining the location of said decoding sequence on said array composition.

25. (Currently amended) The method according to claim 25 ~~24~~, further comprising:

d) ~~adding to said array composition providing a second probe of a set of combinatorial decoding probes comprising :~~ i) a said priming sequence complementary to said primer sequence, said variable sequence and ~~ii) at least one decoding nucleotide~~

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included in said variable sequence that will basepair with at least one nucleotide of at least one of said decoding sequences, ~~said decoding nucleotide comprising a label at a position that is different from the position that basepairs with said decoding nucleotide of said first set of combinatorial decoding probes, wherein said second set comprises different subsets of combinatorial decoding probes, each subset having the same decoding nucleotide and a second label specific to said same decoding nucleotide;~~ and

e) adding to said array composition a subset of said second set of combinatorial decoding probes and detecting the presence of said second label.

26. (Canceled)

27. (New) The method of claim 25, wherein said population of microspheres is randomly distributed on said discrete sites.

28. (New) The method of claim 25, wherein said identifier nucleic acid sequence comprises genomic DNA.

29. (New) The method of claim 25, wherein said identifier nucleic acid sequence is prepared by an amplification technique.

30. (New) The method of claim 25, wherein said first set of combinatorial decoding probes comprises four subsets.

31. (New) The method of claim 25, wherein nucleotides in said variable sequence comprise universal bases.

32. (New) The method of claim 25, wherein at each variable sequence nucleotide position, all possible naturally occurring nucleotides are represented in at least one nucleic acid of said subset.

33. (New) The method of claim 25, wherein said decoding nucleotide comprises an internal nucleotide of said variable sequence.

34. (New) The method of claim 25, wherein said decoding nucleotide comprises a terminal nucleotide of said variable sequence.

35. (New) A method of determining the location of a decoding sequence on an array surface, said method comprising:

a) providing at least a first and a second subpopulation of identifier nucleic acid sequences distributed on said surface, said identifier nucleic acid sequences comprising

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the same primer sequence and a different decoding sequence adjacent to said primer sequence;

b) providing a first set of combinatorial decoding probes comprising a priming sequence complementary to said primer sequence, a variable sequence and at least one decoding nucleotide included in said variable sequence that will basepair with at least one nucleotide of at least one of said decoding sequences, wherein said first set comprises different subsets of combinatorial decoding probes, each subset having the same decoding nucleotide; and

c) adding to said array composition a subset of said first set of combinatorial decoding probes and determining the location of said decoding sequence on said array composition.

36. (New) The method according to claim 35, further comprising:

d) providing a second set of combinatorial decoding probes comprising said priming sequence complementary to said primer sequence, said variable sequence and at least one decoding nucleotide included in said variable sequence that will basepair with at least one nucleotide of at least one of said decoding sequences at a position that is different from the position that basepairs with said decoding nucleotide of said first set of combinatorial decoding probes, wherein said second set comprises different subsets of combinatorial decoding probes, each subset having the same decoding nucleotide; and

e) adding to said array composition a subset of said second set of combinatorial decoding probes.

37. (New) The method of claim 36, wherein said identifier nucleic acid sequence comprises genomic DNA.

38. (New) The method of claim 36, wherein said identifier nucleic acid sequence is prepared by an amplification technique.

39. (New) The method of claim 36, wherein said first set of combinatorial decoding probes comprises four subsets.

40. (New) The method of claim 36, wherein nucleotides in said variable sequence comprise universal bases.

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41. (New) The method of claim 36, wherein at each variable sequence nucleotide position, all possible naturally occurring nucleotides are represented in at least one nucleic acid of said subset.

42. (New) The method of claim 36, wherein said decoding nucleotide comprises an internal nucleotide of said variable sequence.

43. (New) The method of claim 36, wherein said decoding nucleotide comprises a terminal nucleotide of said variable sequence.